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# A sample study for classroom teachers addressing the importance of utilizing history of math in math education

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**Abstract**

It is aimed to present a sample study on increasing the comprehensibility and retainability of subjects by utilizing history of math which is very important but also ignored in the curriculum. The perception of math as an abstract course causes anxiety in primary school children. Elimination of this problem is possible, especially with the method of application of classroom teachers in accordance with the methods that are optimum to students level, and they attract attention to their cause-effect relationships in nature must be capable of understanding. Utilizing from history of mathematics is the best way to take advantage of this. So that the students in fact the cause of their operations and that the issue of who or who were proved how they think, how our lives have a significance of that would be understood. And get rid of these anxiety, the class met and more willing, as well as of course will be more successful. The replication of these studies is important to include the new historians of mathematics also from our country.



*Keywords:* Mathematics teaching; curriculum; teaching methods; history of mathematics; mathematics.

## 1. Introduction

In 21. century the importance of education appears to be rising with each passing day. Persons who renews itself, can think creatively, problem-solving process can be applied, as well as the information provided to accept the most accurate information rather than self-critical thinking that can reach investigate individuals can be successful. It should not be underestimated to have more from these people in order to reach our country further to the upper level. The main way to achieve this objective is to make the quality of curriculum programs most appropriate, keeping in mind the needs of our country. From this view the elementary education curriculum program regulations set out in the interaction between different disciplines work was intended to provide. The different educational techniques have been used in mathematics lessons for implementation.

Historical analysis has been the basis for the theory that mathematics should be related to life situations. Mathematics was invented in the great civilizations in Babylonia, Egypt, Aztecs, Chinese, Indians, Greek, Romans, and Western Europe as response to social and economic needs and problems of age. In the earlier civilizations, solutions were mostly empirical, which gave rise to deductive and theoretical methods in the modern age (Clarke,

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2003). The historical development of mathematics has demonstrated that the subject is related to economic and social contexts. At every period of its development, new concepts were added, and the discipline was related to prevailing ideologies and practical needs. More than ever, today society is characterized by technological developments as its essential lifestyle. At every stage mathematics is required to solve real problems. Indeed common existence is impossible without the application mathematics. Whether it is obtaining a mortgage loan, purchasing annuities, constructing bridges, or houses, orbiting in space, communication across national boundaries on the Internet, or playing the lottery, knowledge of mathematics enables one to operate effectively (Kool, 2003).

More than a century ago, Hieronymus George Zeuthen (1902, Furinghetti, Radford, 2002) wrote a book about the history of mathematics. Of course, this was not the first book on the topic, but what made Zeuthen's book different was that it was intended for teachers. Zeuthen proposed that the history of mathematics should be part of teachers' general education. His humanistic orientation fitted well with the work of Cajori, 1894 who, more or less by the same time, saw in the history of mathematics an inspiring source of information for teachers. Since then, mathematics educators have increasingly made use of the history of mathematics in their lesson plans, and the spectrum of its uses has widened. For instance, the history of mathematics has been used as a powerful tool to counter teachers' and students' widespread perception that mathematical truths and methods have never been disputed. The biographies of several mathematicians have been a source of motivation for students (Furinghetti, Radford, 2002).

Using the history of mathematics as an introduction to a critical and cultural study of mathematics is one of the most important challenges for mathematics teachers and for students. There are many possibilities in mathematics education for the use of history (Grugnetti, 2000). What teachers know and understand about mathematics makes a difference to the quality of their teaching. This means more professional development dedicated to improving teachers' knowledge of mathematics, improving the ways in which they know and understand content so they can teach it better, and improving their knowledge of how students learn particular concepts and topics (Friesen, 2006). The mathematics educator must filter out from the history of mathematics what it is relevant from what is irrelevant and what is useful from what is not. If there is a problem, most educators, would consider it more practical than theoretical. In other words, what one has to worry about in combining history and mathematics education is chiefly how to do it: What examples should one chose for what material? What kind of history of mathematics activities can be incorporated into the ordinary mathematics curriculum? How does one find time for such activities? How does one find a place for history of mathematics in teacher training? Yet, when one follows these questions to their theoretical end, one begins to see a theoretical problem (Fried, 2008). Take, for example, the problem of time, for this would appear the most practical of these practical problems. Avital (1995, p.7, Fried, 2008) says in this connection, "Teachers may ask 'Where do I find the time to teach history?' The best answer is: 'You do not need any extra time'. Just give an historical problem directly related to the topic you are teaching; tell where it comes from; and send the students to read up its history on their own". In this study, we want to show an examle for teacher how they use the history in their matehamatics lessons.

## 2. Method

This research was implemented by using quantitative research methods. In the quantitative research format; front-end test model with experimental-control group was used. Research was implemented on two groups. Groups are assigned through random-assignment experiments and neutral control group. In the experimental group it is used a differentiated curriculum for mathematics and lesson materials by utilizing the history of mathematics. In the control group teaching was continued without this differentiated curriculum.

The sample of study consisted of 90 (45 of experimental group, 45 of control group) students from Sehit Tegmen Ali Yilmaz Primary School in Istanbul. The research data were derived from Mathematics Achievement Test. Demographical information form, which was prepared by the author of this paper was used. Chi-Square Test and a Paired-Samples T-Test Analysis were used for statistical analyses.

## 3. Results (Findings)

Table 1. Frequency And Percentage Values of The Gender Variable

| Gender | f | % |
|---|---|---|
| Boy | 43 | 47,8 |
| Girl | 47 | 52,2 |
| Total | 90 | 100,0 |

As can be seen in Table 1, there are 90 students 47 (52, 2%) of those are girls and 43 (47,8%) of those are boys.

Table 2. Frequency And Percentage Values of The Age Variable

| Age | f | % |
|---|---|---|
| 10 | 22 | 24,4 |
| 11 | 60 | 66,7 |
| 12 | 7 | 7,8 |
| 13 | 1 | 1,1 |
| Total | 90 | 100,0 |

As can be seen in Table 2, there are 90 students 22 (24,4%) of those are ten year olds, 60 (66,7%) of those are eleven year olds, 7 (7,8%) of those are twelve year olds and 1 (1,1%) of those is thirteen years old.

Table 3. Frequency And Percentage Values of Math Score Variable

| Math Score | f | % |
|---|---|---|
| 1 | 18 | 20,0 |
| 2 | 12 | 13,3 |
| 3 | 17 | 18,9 |
| 4 | 22 | 24,4 |
| 5 | 21 | 23,3 |
| Total | 90 | 100,0 |

As can be seen Table 3, there are 90 students 18 (%20, 0) of those have math score 1, 12 (%13,3) of those have math score 2, 17(%18,6) of those have math score 3, 22 (%24,4) of those have math score 4 and 21 (%23,3) of those have math score 5. Majority of our sample group constitutes successful students in mathematics courses.

Table 4.The Results of Paired-Samples t Test which was Applied to Identify the Difference Between Pretest-Posttest Point Averajges with Experiment Group Math Success Test

| Groups | *N* | $\overline{X}$ | *SS* | $Sh_x$ | $t_{Test}$ | | |
|---|---|---|---|---|---|---|---|
| | | | | | *Sd* | *t* | *p* |
| Pre-Test | 45 | 6,7778 | 1,14592 | ,17082 | 44 | -8,993 | ,000 |
| Post-Test | 45 | 8,4444 | ,94281 | ,14055 | | | |

**p<.05**

When the relations between pretest and post-test points applied in the experiment group are taken into consideration, it is observed that the programme applied has increased the success of students. The relation is considered to be meaningful in terms of statistics.

Table 5. The Results of Paired-Samples t Test which was Applied to Identify the Difference Between Pretest-Posttest Point Averajges with Control Group Math Success Test

| Groups | *N* | $\overline{X}$ | *SS* | $Sh_x$ | $t_{Test}$ | | |
|---|---|---|---|---|---|---|---|
| | | | | | *Sd* | *t* | *p* |
| Pre-Test | 45 | 6,1778 | 1,21148 | ,18060 | 44 | 1,915 | ,062 |
| Post-Test | 45 | 5,8444 | 1,50689 | ,22463 | | | |

**p>.05**

When the relations between pretest and post-test points applied in the control group are taken into consideration, the difference between them is not considered to be meaningful in terms of statistics. As a result of the course presented without any recourse to history of maths, no increase has been observed in the success of students in the course of maths.

Table 6. The Results of Chi-Square Test which was Applied to Identify whether the Attention Paid to Maths Courses Depends on the Variant of Understanding the Usage of Maths in Daily Life

| | | The attention paid to maths courses | | Total | $X^2$ | Sd | p |
|---|---|---|---|---|---|---|---|
| | | Yes | No | | | | |
| Variant of understanding the usage of maths in daily life | Yes | 64<br>95,5% | 3<br>4,5% | 67<br>100,0% | 11,68 | 1 | ,002 |
| | No | 16<br>69,6% | 7<br>30,4% | 23<br>100,0% | | | |
| Total | | 80<br>88,9% | 10<br>11,1% | 90<br>100,0% | | | |

As seen in the table, as a result of the Chi-Square Test which was applied to identify whether the attention paid to maths courses depends on the variant of understanding the usage of maths in daily life, the dependence between the variants are found to be meaningful in terms of statistics. In maths courses, the attention to history of maths and to learn the usages of maths rules in daily life increase the attention paid to maths courses.

Pre-Test and Post-Test results was evaluated and it is found that, in the classroom that teached by utilizing thehistory of machematics, math students understand the subject more easily.

## 4. Discussion

The integration of history in didactic practice helps the students to understand that mathematics is not a fixed finalized knowledge system, but a live development process, closely connected with other branches of science (Furinghetti, 2002, Furingetti & Somaglia, 1998, Tzanakis & Arcavi, 2000, Tzanakis & Thomaidis, 2000). It helps the student to understand that mistakes, doubts, intuitive arguments, controversies, and alternative approaches to problems are not only legitimate but also an integral part of mathematics in the making (Tzanakis & Arcavi, 2000, p. 205). Farmaki and friends (2004) used to integration of historical data in designing the activities. Their study's results is like our study's results.

In synthesizing advice from teachers, mathematics historians, mathematics educators, and preservice teachers, we identified four essential benefits. Integrating history and mathematics instruction sharpens problem-solving skills, lays a foundation for better understanding, helps students make mathematical connections, and highlights the interaction between mathematics and society. Using history lends itself naturally to connecting mathematics with other disciplines when the focus is on how mathematics has influenced world history, science, economics, inventions, and communications (Bidwell 1993; Fauvel 1991).

Mariolein Kool (2003) says that historical Standard problems can become non-standard and challenging problems in modern mathematics education. The historical standard solution can play an important part in the classroom discussion about different solution methods. In an experiment with 20 primary school students of 11 and 12 years of age, it became clear that the interactive discussion about solutions in the classroom can become vivid if there is a historical solution among them. This experiment was carried out in the Dutch primary school of St. Michiel in Schalkwijk. Only one classroom with primary students and three historical problems were involved in this experiment. The results are promising. There are many suitable problems in old textbooks. And in this experiment they have seen that it could be interesting to give children the opportunity to solve these problems in their own way, to construct their own solution methods. Afterwards the teacher can organize interactive classroom talks to compare and discuss the solutions of the students. In this discussion the solution method of the child that lived 450 years ago can play an interesting part. The solutions of the past make children think about different solution methods, old and new ones, clever and cumbersome ones. They discover that there are many different ways

to do it and they develop respect for the mathematics of their historical classmate. Also my study's results (2008) about history of mathematics for creative teaching for gifted and normal students like as this study's results.

## 5. Conclusion and Recommendation

Of course, finding ways to integrate history and mathematics is the challenge for teachers. Fauvel (1991, Wilson, Chauvot, 2000) argues that we must go beyong understanding the contributions of history and address how we might incorporate history. He points out that using history in mathematics instruction is not a simple task; history is not an additive that "can just be poured in at the right time, like fabric conditioner into one's washing machine"

Using the history of mathematics can be more than just a hobby of the teacher. The history of mathematics lets children experience that mathematics ,is always developing, that it is continuously changing and that they are part-of this evolution. Mathematics is not fixed. It is valuable for children to know about the history of mathematics, which cultures, which big names, which ordinary people have contributed to its development? What can they add to it themselves? (Kool, 2003).

This study makes the teachers aware of the importance of the mathematics history in terms creative teaching. This way, the students can enjoy and learn mathematics more effectively. Students have enjoyed this activity as it allows them to make an efficient use of their creativity and expressed their satisfaction of learning mathematics in a more enjoyable way. Using their creativity, teachers may benefit from the mathematics history and prepare a variety of activities. Teachers made history of maths draw the attraction of students. If teachers talk about the sources of rules, theorists, the usages of maths rules in daily life in maths courses, the courses they offer will be better understood.

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